

Los Alamos National Laboratory
Environmental Restoration Project
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COORDINATING AND EVALUATING GEODETIC SURVEYS

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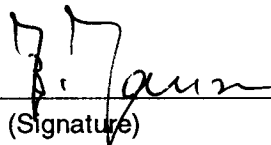
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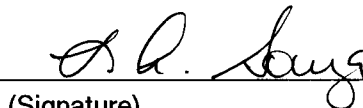
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COORDINATING AND EVALUATING GEODETIC SURVEYS

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COORDINATING AND EVALUATING GEODETIC SURVEYS

1.0 PURPOSE

This procedure establishes the methodology for initiating and coordinating geodetic surveys with professional surveyors and establishes the data requirements, chain of command, and quality assurance/quality control (QA/QC) procedures for geodetic survey data.

2.0 SCOPE

2.1 Applicability

2.1.1 Activities

This procedure applies to all Environmental Restoration (ER) Project activities that require geodetic surveys to determine accurate locations. Sites that may require surveying include sample locations, grid points, photographic sites, and miscellaneous measurement points.

2.1.2 Personnel

This procedure applies to all ER Project personnel and contractor personnel who are involved with coordinating and evaluating geodetic surveys. Several professional surveying companies are currently under contract to Los Alamos National Laboratory (the Laboratory) to provide surveying services; however, other accredited professional surveying companies may be used as required.

Under the New Mexico Engineering and Surveying Practice Act, licensed professional engineers or other surveyors with comparable qualifications and demonstrated experience can perform design, construction, or topographic surveys including photogrammetric methods. Only licensed professional land surveyors are authorized to perform control, property, easement, or boundary surveys. It is recommended that surveyors be certified and registered in the State of New Mexico.

2.2 Training

The field team leader (FTL), field team members, and surveyors who perform geodetic surveying for the ER Project must be familiar with the objectives of field surveying and must document that they have read and understand this procedure, LANL-ER-SOP-03.01, R0, and the other procedures in Section 1.0, "General Instructions."

3.0 DEFINITIONS

- A. Geodetic surveying: The method used to determine the precise position and/or dimensions of a particular locality or tract of land by direct measurements and by the application of geometric and trigonometric principles.
- B. Survey coordinates: Coordinates that are expressed in a Cartesian system, which includes X, Y, and Z components (east, north, and elevation, respectively).

4.0 BACKGROUND AND/OR CAUTIONS

Two survey grid coordinate systems have been identified in the Laboratory area. The 1927 North American Datum system (NAD 27) was established and used until it was supplanted by the 1983 North American Datum system (NAD 83). United States Geological Survey (USGS) Bulletin 1875-B provides the specific divergence between the two data systems.

The NAD 83 coordinate system must be used consistently for the ER Project at the Laboratory. Survey coordinates must be declared in established New Mexico state plane coordinates and elevations, which are expressed in footage measurements.

5.0 EQUIPMENT

N/A

6.0 PROCEDURE

All field observations, comments, and deviations from this procedure must be documented in the daily activity log in accordance with SOP-01.01, "General Instructions for Field Investigations."

6.1 Health and Safety Prescreening

At the request of the FTL, Group ESH-1, Group ESH-5, or a contractor industrial hygienist who has been approved by one of these groups prescreens for health and safety purposes the field site to be surveyed. If readings at the site are above health and safety action levels for worker safety, as determined by one of these groups, then no survey of the site should be attempted unless authorized by one of these groups.

6.2 Field Team Leader Responsibilities

The FTL or the designated field team member determines the locations and spacing requirements of sample locations, grid points, and other sites that require surveying. The FTL contacts the surveyor and conducts an on-site briefing to establish the requirements of the survey and to indicate to the surveyor the locations of sample sites and/or grid points to be surveyed. The FTL then provides to the surveyor in writing the location identification (ID) number for each point to be surveyed. The

FTL may also provide to the surveyor a sketch map of the site showing the approximate locations of the sites to be surveyed.

6.3 Surveyor Responsibilities

The surveyor surveys the sample locations, grid points, and other sites using the best available surveying practices, linking the surveyed locations to established survey control monuments. The surveyor then provides the FTL with the following information no later than one week after completing the survey.

- Two signed, certified copies of a map that shows the surveyed locations and the control points used in the survey. All points shown on the map must be identified by location ID and/or site name, site type, and elevation. The maps must contain an appropriate scale bar and a written scale factor, and must indicate the NAD coordinate system that was used.
- A certified paper copy of the survey results showing location ID; X, Y, and Z coordinates; and a description of each surveyed location and control point.
- A statement of the precision and accuracy of the survey data.
- An ASCII file on a floppy computer disk that contains the location ID; X, Y, and Z coordinates; and a description of each surveyed location and control point. The survey data should be arranged in a columnar format with appropriate labels for each column.

6.4 Preliminary Quality Assurance/Quality Control Review

The FTL conducts a preliminary QA/QC review of the map and survey data for completeness and accuracy and for the appropriate relative location of each survey point. The following components are checked.

- Verify that all control points, such as bench marks and control monuments, are within acceptable error limits and are located properly.
- Compare the locations of the surveyed points with other known ground control points, such as control monuments, buildings, structures, pipelines, and power lines.
- Verify that the surveyed points conform to the actual arrangement of the environmental points, grid points, and sample locations.
- Compare the locations and elevations of the surveyed points with other topographic data on maps such as those from the Facility for Information, Analysis, and Display (FIMAD) and the USGS.

If an error or omission is encountered or if any other question arises from the survey data, the FTL contacts the surveyor to obtain additional or missing information or to request that the surveyor repeat the survey or portions thereof.

6.5 Handling Survey Data

When the survey data appear acceptable, the following procedures are followed.

- The FTL provides to the data manager of the field unit (FU) the survey data and one original, certified survey map.
- The data manager incorporates the survey data into the FU database and transfer the data to FIMAD.
- FIMAD incorporates the survey data into the FIMAD database.
- The FTL requests a plot of the survey data onto a map that also shows existing structures and other ER Project sites for final graphic review and QA/QC assessment of the survey data.

6.6 Final Quality Assurance/Quality Control Review

The FTL and the data manager must review the FIMAD map and conduct a final QA/QC review of the survey data for completeness, accuracy, and suitability for ER Project purposes. The following components are checked.

- Verify that all control points, such as bench marks and control monuments, are located properly.
- Compare the locations of the surveyed points with other known ground control points, such as control monuments, buildings, structures, pipelines, and power lines.
- Verify that the surveyed points conform to the actual arrangement of the environmental points, grid points, and sample locations.
- Compare the locations and elevations of the surveyed points with other topographic data on the FIMAD map.

If the survey data are complete and accurate, no further action is required. If an error or omission is encountered, the FTL contacts the surveyor to obtain additional or missing information or to request that the surveyor repeat the survey or portions thereof, and the QA/QC procedure described in Sections 6.4 through 6.6 is repeated.

See Attachment A for a flow diagram that outlines the procedure for coordinating and evaluating geodetic surveys.

7.0 REFERENCES

The following procedures are directly associated with this procedure and must be reviewed before field operations:

LANL-ER-SOPs in Section 1.0, General Instructions

LANL-ER-SOP-1.01, General Instructions for Field Investigations

LANL-ER-SOP-3.01, R1, Land Surveying Procedures

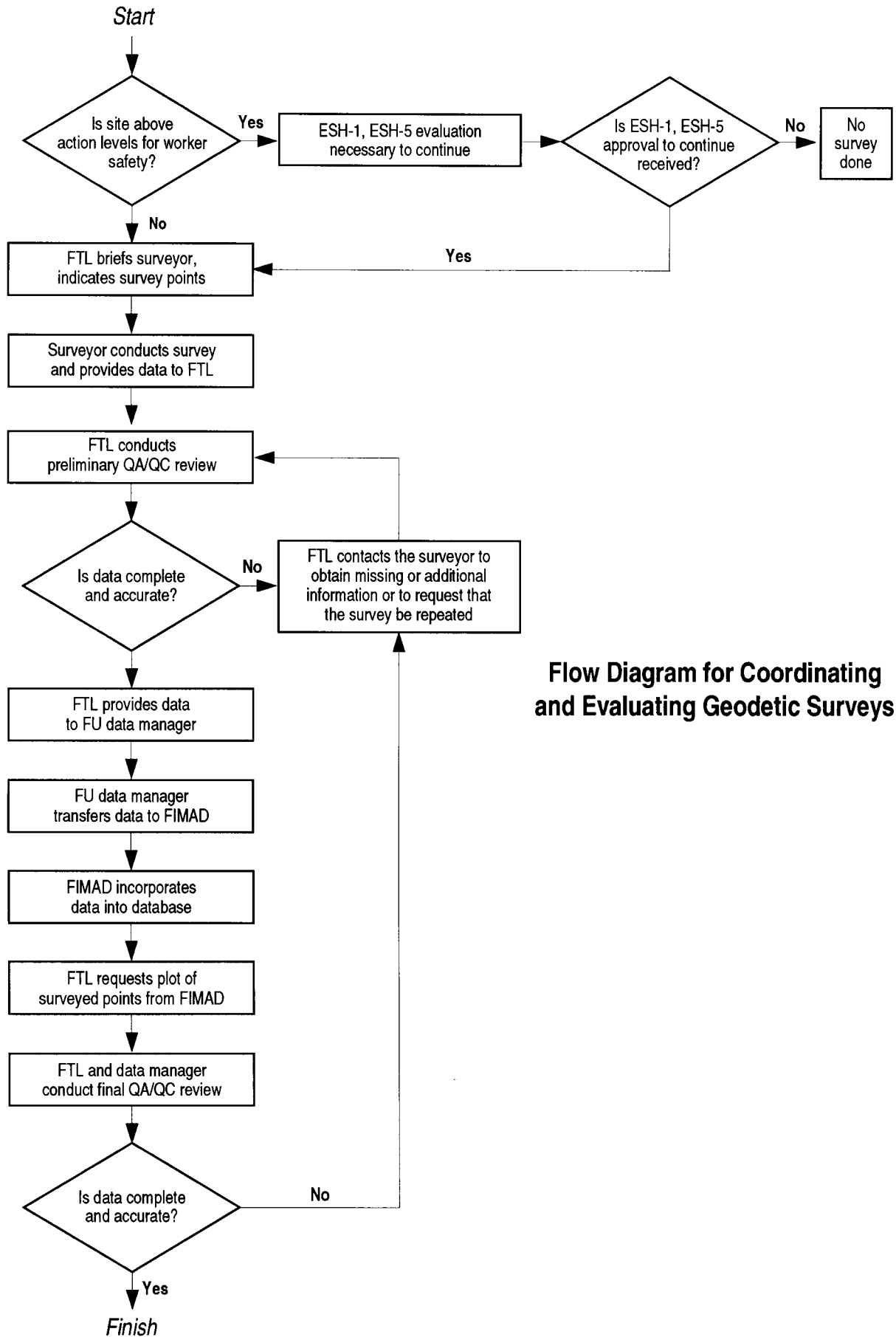
"North American Datum of 1983, map data conversion tables; United States west of 96° West longitude (including Hawaii)," US Geological Survey Bulletin 1875-B, Washington, DC, 1989, pp. B1–B431.

8.0 RECORDS

The FTL is responsible for ensuring that completed daily activity logs, which include any additional information or deviations and the justification for the deviations are sent to the ER Project Records Processing Facility in accordance with LANL-ER-AP-02.01.

9.0 ATTACHMENTS

Attachment A – Flow Diagram for Coordinating and Evaluating Geodetic Surveys



Flow Diagram for Coordinating and Evaluating Geodetic Surveys